

PULP AND PAPERMAKING PROPERTIES OF A HYBRID POPLAR CLONE GROWN UNDER FOUR MANAGEMENT STRATEGIES AND TWO SOIL SITES¹

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ABSTRACT

A study was undertaken to evaluate the pulp and papermaking properties of short rotation intensive culture (SRIC), three-year-old, *Populus* hybrid grown under four management strategies (control, irrigation, fertilization, and fertilization/irrigation) on two sites with either favorable or unfavorable inherent conditions for high biomass yields. No large differences in total pulp yields were observed with management strategy, although the fertilization/irrigation growth strategy produced debarked chips that gave slightly higher total pulp yields with lower permanganate numbers than did debarked chips obtained from the other three growth strategies. In addition, no significant differences ($P \leq 0.05$) in total kraft pulp yields were observed between sites. As expected, the wood/bark chip mixture for each management strategy and site produced significantly lower pulp yields with higher permanganate numbers compared to the debarked chips.

Handsheet strength evaluation studies were conducted using these pulps, and no statistical differences in handsheet breaking length, tear, burst, and M.I.T. fold were measured among management strategies or sites. However, longer fibers were measured from wood obtained from trees grown on the Basher (favorable) site. No statistical differences in handsheet properties were measured between debarked and total tree pulps. Results of this study indicated that neither the growth management strategy nor the soil site influenced handsheet strength properties for three-year-old *Populus* hybrid. These observations imply that the silviculturalist should grow SRIC *Populus* trees that produce the highest biomass yield at lowest possible cost.

Keywords: Hybrid poplar, management strategies, pulp, papermaking, soil sites.

INTRODUCTION

Short rotation intensive culture (SRIC) poplar plantations have potential for application as a raw material supply for the pulp and paper industry (Crist 1983; Nielson 1981; Zavitkovski and Dawson 1978). Previous studies have shown that satisfactory kraft pulping characteristics can be obtained from various poplar species grown on rotations as short as five years (Marton et al. 1968; Zarges et al. 1980). Investigators suggest that rotations of less than four years' duration may not be suitable because of lower wood density, tension wood, inferior pulp yield as well as relatively high bark contents (Kerridge et al. 1979; Isebrands and Parham 1974).

Recent studies showed that kraft pulp yield differences occurred among three-

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